

CLAIMS

- 1 1. Apparatus comprising
2 a cavity having a cavity dimension, the cavity being
3 configured so that the cavity dimension changes in response to
4 electrostatic forces applied to the cavity, and
5 at least two electrical structures configured to apply
6 electrostatic forces in the vicinity of the cavity, the electrical
7 structures being independently controllable.
- 1 2. The apparatus of claim 1 in which the cavity dimension is
2 determined by a distance between two walls, and the cavity
3 dimension determines optical properties of the cavity.
- 1 3. The apparatus of claim 2 in which the optical properties
2 include interference.
- 1 4. The apparatus of claim 2 in which the optical properties
2 include reflectance.
- 1 5. The apparatus of claim 1 in which the two electrical
2 structures comprise electrodes.
- 1 6. The apparatus of claim 1 in which the electrical structures
2 lie on a wall of the cavity.
- 1 7. The apparatus of claim 6 in which the electrical structures
2 lie side by side on the wall of the cavity.

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1 8. The apparatus of claim 1 in which the cavity comprises an
2 interference modulator and the cavity dimension determines an
3 optical state of the modulator.

1 9. The apparatus of claim 1 in which changes in the cavity
2 dimension that occur in response to the electrostatics forces are
3 characterized by hysteresis.

1 10. The apparatus of claim 1 also including a second cavity
2 adjacent to the cavity, the cavity and the second cavity sharing a
3 common wall.

1 11. The apparatus of claim 1 also including stops within the
2 cavity, the stops defining an intermediate cavity dimension
3 between a minimum cavity dimension and a maximum cavity
4 dimension.

1 12. The apparatus of claim 11 in which the stops define
2 channels between them in which portions of a wall of the cavity lie
3 in response to electrostatic forces.

1 13. The apparatus of claim 11 in which one of the electrical
2 structures comprises electrodes embedded within the stops.

1 14. The apparatus of claim 11 in which the stops lie on a
2 movable wall of the cavity.

1 15. The apparatus of claim 14 also including apertures in a
2 second wall of the cavity configured to receive the stops.

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1 16. The apparatus of claim 1 also including

2 additional cavities having cavity dimensions, each of the
3 cavities being configured so that its cavity dimension changes in
4 response to electrostatic forces applied to the cavity, and

5 additional electrical structures configured to apply
6 electrostatic forces in the vicinities of the cavities, each of the
7 additional cavities being associated with at least two of the
8 additional electrical structures, the electrical structures with which
9 each of the cavities is associated being independently controllable.

1 17. The apparatus of claim 16 in which at least some of the
2 electrical structures associated with at least some of the respective
3 cavities are coupled together.

1 18. The apparatus of claim 16 in which the cavities are
2 organized in groups by coupling together of selected electrical
3 structures.

1 19. The apparatus of claim 18 in which the coupling comprises
2 bus conductors.

1 20. The apparatus of claim 18 in which the coupling comprises
2 bus elements fabricated on multiple levels of the apparatus.

1 21. Apparatus comprising
2 an array of interferometric modulators,

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3 actuation electrodes associated with the respective
4 interferometric modulators, and

5 a pattern of conductors connecting the actuation electrodes
6 in groups.

1 22. The apparatus of claim 21 in which the groups comprise
2 rows or columns of the actuation electrodes.

1 23. The apparatus of claim 21 in which the groups comprise
2 pixels of a display.

1 24. The apparatus of claim 21 in which each of the
2 interferometric modulators is associated with more than one of the
3 electrodes.

1 25. The apparatus of claim 24 in which the pattern of
2 conductors connects different ones of the electrodes associated
3 with each of the interferometric modulators in a configuration that
4 enables them to be energized independently.

1 26. The apparatus of claim 21 in which the electrodes are
2 arranged on walls of cavities of the interferometric modulators.

1 27. A method comprising
2 energizing one electrical structure to apply an electrostatic
3 force in the vicinity of a cavity,

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4 independently energizing another electrical structure to
5 apply an electrostatic force in the vicinity of a cavity.

1 28. The method of claim 27 in which the one structure is
2 energized to move an element of the cavity to a first position, and
3 the other electrical structure is energized to maintain the element in
4 the first position.

1 29. The method of claim 28 also including de-energizing the
2 one structure while the other structure remains energized.

1 30. The method of claim 27 also including controlling the
2 energizing of the one electrical structure and the other electrical
3 structure to effect more than two optical states of the cavity.

1 31. The method of claim 27 also including energizing one
2 electrical structure to apply an electrostatic force in the vicinity of
3 each of multiple other cavities, and independently energizing
4 another electrical structure to apply an electrostatic force in the
5 vicinity of each of the multiple other cavities.

1 32. The method of claim 31 also including controlling the
2 energizing of the electrical structures to independently control the
3 optical states of groups of one or more of the cavities.

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